Analysis of Wireless Sensor Network and IoT technology Based Animal Fitness Monitor System

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Abstract : Internet of Things (IoT) is another insurgency of the Internet. It is a type of network that associates anything with the Internet through different information devices to conduct data exchange and communications in order to complete smart recognitions, monitoring, and management. In this paper we are analysis the capability of Wireless Sensor Network and IoT technology that improve human interaction with animals as well as explore the basic types of IoT sensor that use in this approach. The Animal Fitness Monitor System consist of animal fitness care benefiting the dairy farmers by using Wireless Sensor Network technology and IoT applications. Wireless sensor devices attached in the farm will collect the physical information of sensors (temperature, heart Rate, load cell) of animal and this data pass it onto the Micro-controller individually. The IoT platform is responsible for the integration and organization of sensor data. Finally this approach the Animal Fitness Monitoring will help to improve the efficiency and efforts of the dairy farmer also expect the disease and display the solution onto the farmer mobile phone.

Keywords: Animal Fitness Monitor System; Internet of Things; Wireless Sensor Network; Sensors.

1. Introduction

Dairy farming in India is playing an important role in the total milk production and economy of our country. More than 70% of Indian population relies on cattle farming for their sustenance. In India there is a wealth of rural areas where people still depends on the cattle's as their source of income. Many dairies have many animals. Therefore it is too problematic to take attention of them and to monitor usually the fitness of dairy cattle. So this work is very difficult to the owner of cattle farm. The cattle farm is dependent on the animal's aptitude to live a healthy life and produce product that can become the next generation of the Cattle farm. Cattle farming require system for manage fitness, reproduction and calf care in addition to the nutrition and financial aspects on the farm. The main aspect of fitness monitoring system is to check continuously the fitness of individual of animal, easily diagnosis and treatment of sick animal as early as possible.

Internet of things (IoT) is the new networking concept where any physical object can be globally discovered and queried throughout the internet. IoT defined as association of uniquely identifiable embedded computing sensors within the existing infrastructure. IoT has the capability to change the world. Smart cattle farming based on IoT technologies will enable to reduce waste and enhance productivity also have to take good care of animals.

There are many problems in India, such as lack of water, hard weather conditions, lack of infrastructure and transport facilities. IoT based system for cattle farming may help to resolve these problems up to some extent. In this paper, analysis of different technologies is performed and on the basis of that analysis a best solution for wireless connectivity of cattle farm, is outlined.

Rest of the paper is structured as follows; Section 2 Review the IOT and animal fitness monitoring system. Section 3 introduces the animal fitness system in the proposed IoT system. Section 4 comparative analysis the techniques, Section 6 experiment result of proposed IoT system. Finally, we conclude our paper in Section 6.

2. Material and Method:

In this section, present the background on the IoT as well as animal fitness Monitoring System. IoT is a new knowledge that is being adopted by organizations to provide interconnectivity of network devices, which makes it possible to collect, process, and analysis the information from every object. Animal fitness monitoring can help those farmers who regularly suffer due to the poor health condition of their animal and unavailability of good veterinary.

A. Internet Of Things

IoT is an association of physical objects, devices and other item that include many electronic sensors and actuators to help them interconnect and sense or interact with their internal states or their environment all via the network. This also implies that, for the objects to communicate they must feature an IP address for Internet connectivity. Barrett [3], defines IoT is an organization of unified computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and transfer data over a network without requiring User-to-User or User-to-Computer interaction. A growing portion of IoT devices are created for consumer use, including connected vehicles, home automation/smart home, wearable technology, connected health, and appliances with remote monitoring capabilities.

B. Animal Fitness Monitor system:

Animal Fitness Monitor system allows monitoring animal health, the time for reproduction and the birthing process. Doing so, they have the possible to reduce labor and management costs whilst increasing milk yield. Continuous innovations in the field of Internet of Things (IoT) have opened many new opportunities for monitoring animals and have been speeding up the development of this system. Main object of system to improve the various aspects of dairy management such as detecting signs of diseases at an early stage, cow identification, predicting the calving moment and knowing when to inseminate the cows. Also this system provides accurate and real time health parameters of the cattle which are incredibly helpful in monitoring the health condition and detecting any change in behaviour and health problems. Kunja et.al [1] has given a concept about fitness monitoring system using zigbee module in his paper "Animal Fitness monitoring system using Arduino and LabVIEW for early detection of diseases" LabVIEW is a graphically-based programming language developed by National Instruments. Its graphical test and measurement, automation, instrument control, data acquisition, and data analysis applications

C. Related Work

A common classification in fitness management is depending on two approaches such as direct contact or in indirect contact. In indirect contact approach will not take any kind of fluids or any this directly from animal. But it contain of many sensors by analyzing the variation in the threshold the infections can be examined. In direct contact approach direct contact with separate animals is needed and it is painful and time consuming. By taking blood, and several fluid and examining is time consuming task.

Ankit Bhavsar et al. describe the ZigBee network topology for the cattle heath monitoring and management. This topology works based on Personal Area Network [2]. dmela Jukan et al. suggests systematical evaluation of smart technologies used in cattle welfare, in three main categories of cattle: domestic, farm and wild [4]. Jegadeesan et al. proposes a system which allows to successfully monitoring the fitness of animal, effectively monitor the environmental parameters in the farm and also it can control the environmental parameters in the farm [5]. So we are analyzing a WSN and IoT system for Animal Fitness Monitor System. Fitness condition of every animal is observed in less time. If fitness condition of any animal changes, automatically drugs can be taken. Without human involvement it can monitor the fitness status of each animal with in less time there by reduce chance of epidemics.

3. Architecture for Animal Health Monitoring:

IOT for Cattle farming, Temperature sensor, humidity sensor, gas sensor etc. and communicate with base station over Wi-Fi local network. Node is connected to base station using Wi-Fi network created by router. Base station is powered by Raspberry pi. Raspberry pi has on board Wi-Fi chip to connect to the network. Raspberry pi is going to be used as LAMP Server.
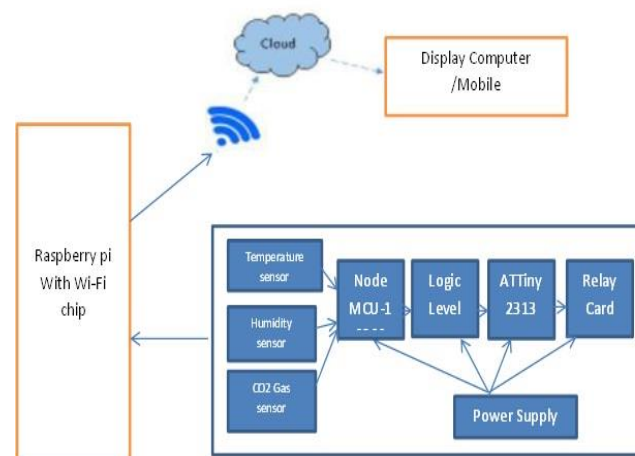

Fig. 1 Block Diagram of Animal Health Monitoring System

4. Analysis:

In this section discussion and analysis is done about different technologies based applications for Wireless Sensor Networks.

Technology	System	Functions	Detected Parameter
Sensor Technology	Embedded System and Sensors	The sensors sense the parameters and transmit them to a monitoring system	Wearable animal health monitor
Animal Health Monitoring System	Arduino and LabVIEW	Early detection of diseases,	heart rate, temperature, rumination and body humidity of the animal
Health monitoring system using wired communication	Electrocardiographic Pill	The technique provides heart rate by way of an electrocardiographic sensor	Only Heart Rate Determination and temperature
IOT Based Animal Fitness Monitor system	ZigBee, RFID, IOT	Animal Fitness & Location Monitoring	heart rate, temperature, rumination and body humidity of the cattle

Table 1: Compare Animal Health Monitoring System

5. Result:

On analysis of all Animal Fitness Monitor System some of fitness parameters are listed below through which animal fitness can be monitors. In analysis will take into account animal with age reference by veterinary and will try to monitor parameters as Food – water consumption, Temperature, Humidity and Rumination.

S.No.	Parameter	Threshold Value
1	Temperature	25–27°C
2	Humidity	50-100%
3	Water Consumption	115 l/Day
4	Food Consumption	2-2.7% BW per day
5	NH3- Ammonia	lactating cows consume 40-60%
6	Body Temperature	100–102.5°F

Table2: Analysis of Animal Health Parameter

This system will be able to give the values of all the parameters by comparing with the orientation values. The system must have an advantage that farmer will be automatically intimated if any of parameter will cross the threshold value which may produce health problem through mobile application.

6. Conclusion:

Now a day the improvement in animal fitness care is rapidly increasing. Dairy farmers face the problems like less milk productivity due to water supply, problems related fitness of animals, and communication with expertise. The proposed system is Animal fitness Monitoring System (CMS) which helps to dairy farmers for increase the milk productivity and manage animal health monitoring.

In this paper we examine the animal fitness monitoring system using WSN and IoT. There are many methods to monitoring each animal separately. There by decreasing the possibility of epidermis in human and animals. In the development of sensing device, we have used the low power electronic components to minimize the power consumption and the device could be run continually maximum times.

On above analysis decided that system for monitoring the fitness of animals should be simple to manage and cost effective. System can be tie up with animal and parameter can be monitor on mobile application. The entire necessity can be finish, if system is developed by IOT and WSN approach. Hence IOT based animal fitness monitoring system is more suitable.

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